amplitude to move the driven element in a first direction when engaged during use of the vibratory component.

144. (Once Amended) A vibratory system for moving a driven element, the vibratory system including the driven element and comprising:

a vibratory element having a driving element comprising a piezoelectric element in driving communication with a resonator that has a selected contacting portion positioned to drivingly engage the driven element during use of the vibratory system;

a resilient element having one end connected to a base and an opposing end connected to the vibratory element to resiliently urge the selected contacting portion against the driven element during use of the vibratory system, at least one of the vibratory element and resilient element being configured to cause the selected contacting portion to move in a first motion when the vibratory element is excited by only a first signal at a single, first frequency having a single phase and provided to the driving element, the motion being of sufficient amplitude to move the driven element during operation of the system; and

wherein the resonator has a plurality of sidewalls defining a recess in which the piezoelectric element is held in compression, the sidewalls being stressed past their yield strength.

REMARKS

Claims 1-7, 9-10, 12-14, 16-18, 20-47, 49-68, 72-75, 77-85, 118-124, and 127-156 are pending. The Examiner Allowed Claims 1-7, 9-10, 12-14, 16-18, 20-26, 35-46, 75, 77-85 and 148-156. Claims 29-32, 34, 47-57, 63, 74 and 127-130 were objected to as depending from rejected base claims but as allowable if rewritten. The remaining pending claims were rejected under Section 112 and/or as obvious. Reconsideration and allowance of the claims is requested in view of the above amendments.

I. Allowed Claims

The Applicant thanks the Examiner for diligently reviewing Claims 1-7, 9-10, 12-14, 16-18, 20-26, 35-46, 75, 77-85 and 148-156, and accepts the allowance of those claims.

II. Section 112 Rejections:

A. Claims 34, 47, 49-57, 118-123 and 127-137:

These claims were rejected under Section 112 ¶ 2 because an angular relationship with a driven element was specified while the driven element was viewed as a "ghost" member.

Claims 27 and 144 are amended to change "excluding" to "including the driven element."

Independent Claims 47, 118, 124, and 127 are believed to have previously defined the system as including the driven element. Claims 47, 118, 124 and 127 are amended to make explicit that which was implicit, and thus are not believed to be narrowing amendments. Claims 49-57 and 134 depend from Claim 47 and are also believed to overcome the Section 112 rejection on the same basis as Claim 47. Claims 119-133 and 137 depend from Claim 118 and are also believed to overcome the Section 112 rejection on the same basis as Claim 118. Claims 128-131 depend from Claim 127 and are also believed to overcome the Section 112 rejection on the same basis as Claim 127.

Claims 132-137 do not define a driven element. Reconsideration and withdrawal of the Section 112 rejection of these claims is requested.

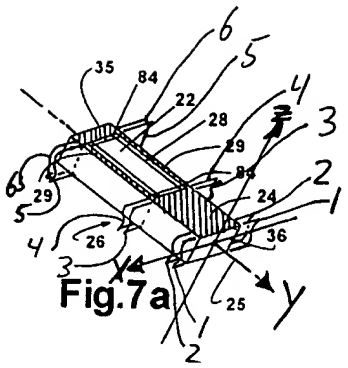
B. Claims 118-123 and 138-143

These claims were rejected under Section 112 ¶ 2. Claims 138-143 define various sections and the Examiner found an insufficiently defined relationship among the sections, as well as uncertainty on a "shaped surface." Those claims are amended to make explicit that which was implicit, and are thus not narrowed. Claims 118-123 do not define these sections or the shaped surfaces.

Claims 118-123 were viewed as referring to "patent". The Applicant's claims refer to a "path" not a "patent."

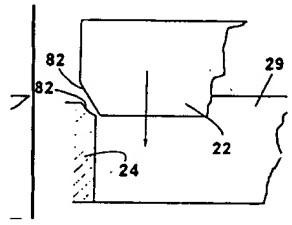
Claim 118 was also said to be indefinite because it referred to "exciting the vibratory element" which was viewed as a method limitation in an apparatus claim. Claim 118 is clarified to specify a "vibratory element being excited' by a second signal. The rewording does not narrow the claim.

Claims 138-143 were rejected as indefinite. In response to the Examiner's request, a sketch of the depicted cross-section is shown here. These claims require that various sections of



the resonator have the same cross-section. The excluded portions of the resonator are located between various planes. The planes are located to exclude such portions of the resonator as the contacting portion and parts of the cavity containing the piezoelectric. For illustration a marked-up version of Fig. 7a is shown here. The various planes (1 - 6) are marked which define three sections of the resonator that are **not** required to have the same cross section. The longitudinal axis (labeled Y) is marked and the planes 1-6 are perpendicular to that longitudinal axis. A second axis (labeled Z) meeting the claim criteria is also marked and that second axis is perpendicular to the longitudinal axis. The lined area shows a cross-section that is perpendicular to the 2nd axis and that has the same cross-section for the entire resonator (excluding the sections defined between planes 1-6).

In the depicted resonator, that cross-section lies in the plane X-Y. As you move plane X-Y along the Z axis, every cross-section of the resonator is the same – if the identified sections are omitted. The first section between planes 1-2 encompasses the selected contacting portion which in some cases will alter the shape of one edge of the resonator to conform to the contour of the driven element. The other planes focus on the ends of the cavity holding the piezoelectric element. In some cases the edges may be inclined as illustrated by the shaped surface 82 of Fig. 7b, shown here. Excluding those portions, the designated cross-section is constant.



As these claims are believed definite, the Examiner is requested to reconsider, and withdraw the Section 112 rejection.

III. Section 102 Rejections of Claims 58-61, 64 & 66

Claims 58-61, 64 and 66 were rejected as anticipated by Mishiro '843, Mishiro 697 and Endo. Claims 58 and 66 are the independent claims.

A. Claim Terms That Were Previously Given No Patentable Weight

The Examiner viewed several claim terms in independent Claim 58 regarding a varying elliptical path as statements of desired function which lacked any structure so they were given no weight in determining patentability. The Applicants disagrees. The claim terms define aspects

of the vibrational source and resonator which are defined as claim elements and which should not be ignored as the Examiner contends. In particular, the claim defines a less than 10 degree variance in the alignment of the elliptical path when the frequency varies by about 200 Hz or more.

The disagreement is easily resolved by slightly rewording independent Claim 58 and others to more positively define these pre-existing features. This is a rewording change to make explicit that which was already stated in the claims and is thus not a narrowing amendment. When all the claim terms are considered, the references cited by the Examiner are inadequate as they lack many features, including a less than 10 degree variance in the alignment of the elliptical path when the frequency varies by about 200 Hz or more as defined in independent Claim 58.

B. Claims 58-61 & 64 re Mishiro Patents

Claims 58-61, 64 and 66 are clarified to define a single signal means moving the selected contacting portion.

Each of the Mishiro patents requires multiple signals (different phases) provided to two different, but adjacent vibrational elements. Thus, two different signals are provided to different vibrational elements.

Moreover, the path in the Mishiro patents is varied by varying the two signals and their phases, not by altering the frequency of a single signal.

This is explained in Mishiro '843 at Col. 3, line 49 to Col. 4, line 3 ("**if the phase** of the drive voltage applied to one electrode 16 **is made to lead** that to the other electrode plate 15, **then the output end portion 18 makes an elliptical vibration**").

In Mishiro '697, two longitudinally expanding discs 11, 12 are stacked against two torsionally expanding discs 13, 14, so that a different signal at a different amplitude and different phase is sent to the two different sets of discs causes in order to adjust the elliptical motion. Col. 4, lines 47-41, & line 57 to Col. 5, line 11, Col. 6, lines 34 to Col. 7, line 52. In particular, Mishiro '697 states: "Thus, composite vibrations various modes, such as ... elliptic vibrations ... are produced by controlling the respective amplitudes and relative phases of the axial driving voltage and the torsional driving voltage." Col. 7, lines 53-58.

Because the references teach the use of two different signals, of different phase, different amplitude and different frequency, the claim requirements are not met. Because there are

different vibrational elements excited with the different signals, the claim requirements are not met.

Moreover, the Mishiro patents do not meet the variation in the alignment of the elliptical path as defined in independent Claim 58. Mishiro '843 varies phase, not frequency and thus cannot be said to meet the defined variation in alignment of the elliptical path when the frequency varies. '843 at Col. 3 line 58 to Col. 4, line 3. Mishiro '697 varies the phase and amplitude, and thus also cannot be said to meet the defined variation in alignment of the elliptical path when the frequency. '697 at Col. 6, lines 34-50.

Reconsideration and withdrawal of the rejection on the Mishiro patents is respectfully requested.

C. Claims 58-61 & 64 Re Endo Patent

Endo has its elliptical motion with the major and minor axis aligned with the predominant axis of the vibrating element. Claims 58-61 & 64 define otherwise. These claims also define the alignment varying by less that about 10 degrees when the first frequency varies by about 200 Hz or more on either side of the first frequency, and Endo does not teach or suggest that.

Since every claim requirement must be identically met for anticipation under Section 102, reconsideration and withdrawal of the rejection of these claims based on Endo is respectfully requested.

D. Claim 66 Re Mishiro & Endo Patents

Claim 66 is clarified to make explicit that which was previously implicit, to define only a single frequency causing two vibration modes that are superimposed to create a first elliptical path, with the first signal being amplified to cause an off-resonance vibration mode to produce the elliptical motion and move the driven element. That is not found in the Mishiro patents or Endo patents.

Indeed, Mishiro uses different signals and phase shifts to generate the elliptical motion as discussed above. Endo applies signals to one of four or more segmented electrodes in order to cause an off-axis movement that generates the elliptical motion. Endo at Col. 5, 40-49. Endo also uses the segmented electrodes to excite the piezoelectric element at resonance. Col. 5, line 47-40 ("the frequency of 8KHz causes the end surface 1 of the block 2 to define the resonance

point of the vertical vibrations and the bending vibrations."); Col. 6, line 42-43 ("the driving section 193 outputs sine wave voltage at the resonant frequency").

For anticipation under Section 102 each claim requirement must be met by a single reference. Here, several claim requirements are not met. Reconsideration and withdrawal of the rejection of Claim 66 is respectfully requested.

IV. Section 103 Rejection of Claims 27-28, 62, 66-67 & 72-73

These Claims were rejected as obvious over Mishiro ('843 or '697) or Endo in view of the Zumeris '421 patent. Mishiro and Endo were cited for the vibration source, resonator and driven member. Zumeris was cited for a spring bias coupling the resonator to the driven member. The suggestion to combine was based on the "obvious necessity" to keep the drive and driven surfaces in contact, and that Zumeris teaches the simplest form of such bias by using a spring attached to a base and urging the vibrator toward the driven member.

Claims 27-28 define structural elements cooperating to excite the defined vibrational mode with a single first frequency. None of the Mishiro, Endo or Zumeris patents do that. Thus, even if combined, the claim requirements are not met.

Moreover, Claim 27 defines the elliptical motion as having a major axis inclined at an angle, and both Endo and Zumeris fail to teach or suggest this angle of inclination.

Reconsideration and withdrawal of the rejection of Claims 27-28 is respectfully requested.

Claim 62 ultimately depends from Claim 58, which defines exciting the defined vibrational mode with a single first frequency. It also defines an orientation of axes at specified frequency changes. None of the Mishiro, Endo or Zumeris patents show these features as combined in Claim 58. Thus, even if combined, the claim requirements are not met. Reconsideration and withdrawal of the rejection of Claim 58 is respectfully requested.

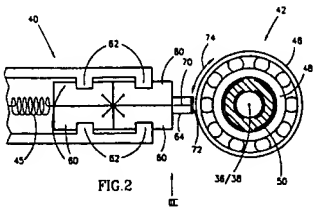
Claims 67-68 depend from Claim 66 and are believed allowable for the same reasons as Amended Claim 66. Moreover, even if combined the claim requirements are not met by the three asserted patents.

There is also no suggestion to combine the references to achieve the defined combination, and the Examiner points to no such suggestion to combine the references to achieve the claimed combination.

Reconsideration and withdrawal of the rejection of Claims 66-68 is respectfully requested.

Claims 72-73 define a signal generator providing a first signal at a first, single frequency having a single phase. The Mishiro and Zumeris patents lack that. Thus, even if combined, the claim requirements are not met.

Claim 72 also defines the longitudinal axis of the vibrating element be inclined at an angle to a tangent to the driven element where the angle is between 10 and 80 degrees. In contrast, the vibrating element in Zumeris is perpendicular to the tangent to the driven element as seen in Figures 1-3 and 10-11 cited by the Examiner, with Fig. 3 shown here for reference. Zumeris rotates circular or spherical objects, and always has the axis of the vibrating element on line extending through the center of the circular or spherical driven element. That orientates the vibrating element perpendicular to the surface and perpendicular to a tangent to the surface. Claim 72 is contrary to the teachings and requirements of Zumeris, so the Examiner's proffered combination of references is not properly combinable.



Endo also lacks this angle of inclination, and Mishiro and Zumeris do not teach or suggest using the defined angle. Thus, even if combined the cited references do not achieve the clamed combination. Moreover, there is no proper suggestion to modify and combine selected portions of the references. Thus, the Examiner is requested to reconsider and withdraw the rejection of these claims.

V. Section 103 Rejection of Claims 32 & 132-137

These claims were rejected as obvious over Mishiro ('843 or '697) or Endo in view of Zumeris '421 and in view of Safabakhsh. Safabakhsh was cited for a pocket that contains the piezo drive elements.

Claim 32 depends from Claim 27, which is discussed above. As Amended Claim 27 is patentable for the above discussed reasons, dependent Claim 32 is also believed allowable. Moreover, Claim 32 defines sidewalls stressed beyond their elastic limit. That defines a structural property of the sidewalls. As discussed in part at pages 34, line 5 to page 39, line 34 of the Application, there are advantages in stressing the sidewalls past their elastic limit. This is not taught or suggested in Mishiro ('843 or '697) or Endo or Zumeris '421 or Safabakhsh. Claim 32 is further allowable for that additional reason.

Claims 132-133 depend from allowed Claim 80. As Claim 80 is allowed, the further features defined in Claims 132-33 are also believed allowable. Moreover, Claim 80 defines the first and second signals being communicated to the vibratory element through the same electrical connection with the vibratory element. Endo switches between electrical connections to send the first and second signals. Endo at Col. 6, lines 1-5 & Figs. 19a & 20.

Claim 134 ultimately depends from Claim 47, which is discussed above. As Amended Claim 47 is patentable for the above discussed reasons, dependent Claim 134 is also believed allowable. Moreover, the circular cross-section of the resonators in Mishiro, and the cross section of Endo, do not meet the defined shapes of Claim 134, as discussed below.

Claim 135 depends ultimately from Claim 58, which is discussed above. As Amended Claim 58 is patentable for the above discussed reasons, dependent Claim 135 is also believed allowable. Moreover, the resonators in Mishiro and Endo patents do not m eet the defined shapes of Claim 135, as discussed below.

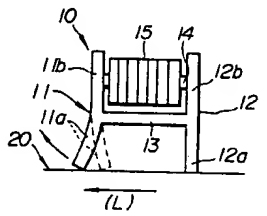
Claim 136 depends ultimately from Claim 72, which is discussed above. As Amended Claim 72 is patentable for the above discussed reasons, dependent Claim 136 is also believed allowable. Moreover, the resonators in Mishiro and Endo patents do not meet the defined shapes of Claim 136, as discussed below.

Claim 137 depends ultimately from Claim 118, which is discussed above. As Amended Claim 118 is patentable for the above discussed reasons, dependent Claim 137 is also believed allowable. Moreover, the resonators in Mishiro and Endo patents do not meet the defined shapes of Claim 137, as discussed below.

VI. Section 102 Rejection of Claims 118-123 On Uchino Or Ohinishi

These claims were rejected as anticipated by Uchino or Ohinishi.

Independent Claim 118 defines two directions of motion at two different frequencies. But both directions of motion are achieved using the same "selected contacting portion." Uchino describes an "H" shaped frame in which each leg 11, 12 of the H is made to have a different resonance characteristic. Col. 2, lines 34-37. At one resonance leg 11 causes the motor to move one direction, and at a second resonance leg 12 causes the motor to move in an opposite direction. Col. 3, lines 10-25; Col. 3, lines 29-31 ("the motor is led along the surface 20 by the resonating leg"). Each leg 11, 12 constitutes a different contacting portion. Uchino does not meet the claim requirement that the same "selected contacting portion moves along a second path to move the driven element in a second direction."



Moreover, Uchino does not have either leg 11 or 12 inclined at the defined angle α where the angle α is from 10-80 degrees.

Ohinishi also does not have the predominant axis having the selected contacting portion located to engage the driven element at the defined angle α where the angle α is from 10-80 degrees.

Reconsideration and withdrawal of the rejection to independent Claim 118 and dependent Claims 119-123 is respectfully requested.

VII. Section 102 Rejection of Claims 138-147 On Uchino Or Ohinishi:

These claims were rejected as anticipated by Safabakhsh, Figures 4-8.

A. Claims 138-143:

These claims require that various sections of the resonator have the same cross-section. As discussed in Section II.B., the excluded portions of the resonator are located between various planes, and the planes are located to exclude such portions of the resonator as the contacting portion and parts of the cavity containing the piezoelectric. For illustration a marked-up version of Fig. 7a is shown here. The

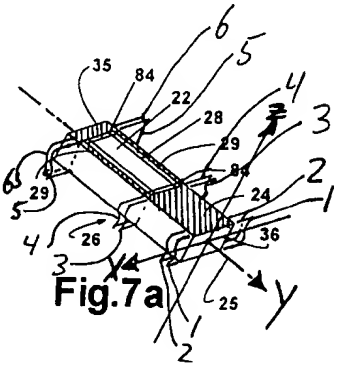
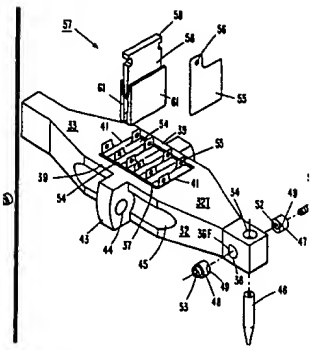


Fig.7a

various planes (1 - 6) are marked which define three sections of the resonator that are **not** required to have the same cross section.



The resonator on of Safabakhsh (5,469,011) does not meet these requirements. An image from Safabakhsh is shown here for ease of reference.

Reconsideration and withdrawal of the rejection to independent Claim 118 and dependent Claims 138-143 is respectfully requested.

B. Claims 144-147

Independent Claim 144 defines a resonator with a plurality of sidewalls defining a recess in which the piezoelectric element is held in compression, with "the sidewalls being stressed past their yield strength." That is believed to define a structural property of the sidewalls of the resonator and is a claim requirement. The defined bending mode is also believed to be a structural recitation.

As discussed in part at pages 34, line 5 to page 39, line 34 of the Application, there are advantages in stressing the sidewalls past their yield strength. This is not taught or suggested in Safabakhsh.

Further, Claim 144 is clarified to more positively recite the second signal, but that is believed to be a rewording that does not narrow the scope of the claim. The second signal and the resulting bending mode is a claim requirement not found in Safabakhsh.

Finally, the resilient element defined in Claim 144 is not believed to be disclosed in Safabakhsh.

Reconsideration and withdrawal of the rejection to independent Claim 144 and dependent Claims 145-147 is respectfully requested.

VIII. Conclusion

The previously rejected claims are believed to be in a condition for allowance and such allowance is respectfully requested.

Attached hereto is marked-up version of the changes made to the claims by the current amendment. The attached is captioned "Version with Markings to Show Changes Made."

The Examiner is urged to contact the undersigned if there is any question on the claims or any other matter that would advance the prosecution of this application.

If any additional fees are required, please charge Deposit Account 19-4330.

Respectfully submitted,

Dated: 5/13/03

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please amend the claims as follows:

27. (Twice Amended) A vibratory system for moving a driven element, the vibratory system including [excluding] the driven element and comprising: a vibratory element having a driving element comprising one of a piezoelectric element and a magnetorestrictive element in driving communication with a resonator that has a selected contacting portion positioned to drivingly engage the driven element during use of the vibratory system; a resilient element having one end connected to a base and an opposing end connected to the vibratory element to resiliently urge the selected contacting portion against the driven element during use of the vibratory system, the vibratory element and the resilient element being configured to cooperate to comprise means for causing [cause] the selected contacting portion to move in a first elliptical motion when the vibratory element is excited to simultaneously resonate in at least two vibration modes by a first signal at a single, first frequency with a single phase provided to the driving element, the elliptical motion occurring without engagement with the driven element, the motion being of sufficient amplitude to move the driven element during operation of the system, and with the first elliptical motion having a major axis inclined at an angle β_1 with respect to a tangent along a direction of motion of a driven element at the selected contacting portion, with the angle β_1 being between about 5-85 degrees when the selected contacting portion is drivingly engaging the driven element during operation of the system.

47. (Twice Amended) A vibratory system having at least one source of vibration drivingly connected to vibrate a resonator to amplify the vibration, the resonator having a selected contacting portion located to be engaged with a driven element to move the driven element in at least a predetermined direction, the vibratory system including the driven element, the vibratory system comprising: a configuration of resonator and driven element that [cooperate to cause] cooperate to comprise means for causing the selected contacting portion to move in a first elliptical path when excited by a first electrical signal, the elliptical path having a major axis and minor axis, the major axis being inclined at an angle β_1 with respect to a tangent to the driven element at the selected contacting portion in the direction of motion of the driven element, the angle β_1 being between about 5-85 degrees; and

said means further moving wherein the selected contacting portion [moves] in a second elliptical path when excited by a second electrical signal sufficient to cause a second motion of the selected contacting portion, the second elliptical path having a major axis and minor axis, the major axis being inclined at an angle β_2 with respect to a tangent to the driven element at the selected contacting portion and in the direction of motion of the driven element, the angle β_2 being between about 5-85 degrees.

58. (Once Amended) A vibratory element having a source of vibration vibrating a resonator to amplify the vibration, the resonator having a selected contacting portion located to be engaged with a driven element to move the driven element in a predetermined direction during use of the vibratory element, the vibratory element further having a means comprising a single, first electrical signal at a single, first frequency with a single phase being applied to the source of vibration and exciting the resonator for moving the selected contacting portion [moving] in a first elliptical path [when the source of vibration is excited by a first electrical signal at a first frequency, the elliptical path] having a major and minor axis which are not aligned with a predominant axis of the vibrating element by a defined angle that varies by less than about 10 degrees when the first frequency varies by about 200 Hz or more on either side of the first frequency.

66. (Once Amended) A vibratory component for moving a driven element, the vibratory component comprising:

a piezoelectric vibration source mounted to a resonator to form a vibrating element; the vibrating element having a selected contacting portion located to engage the driven element during use, the selected contacting portion moving in a first elliptical path having a major axis and minor axis when the vibration source is excited by means including only a single first electrical signal [that causes] for causing at least two vibration modes that are superimposed to create the first elliptical path, the first electrical signal being amplified sufficiently to cause at least one off-resonance vibration mode to produce a motion of the selected contacting portion having sufficient amplitude that the resulting elliptical path can move the driven element during use.

72. (Once Amended) A vibratory system for moving a driven element, comprising:

a driven element movable in at least a first direction;

a vibration source mounted to a resonator to form a vibrating element; the vibrating element having a selected contacting portion located to engage and move the driven element, the at least one of the vibration source and vibrating element forming means for moving the selected contacting portion [moving] in a first elliptical path, wherein a longitudinal axis of the vibrating element [being] is inclined at an angle α to a tangent to the driven element in the first direction at the selected contacting portion, the angle α being between about 10 and 80 degrees when the selected contacting portion is drivingly engaging the driven element;

a signal generator providing a first signal at a first, single frequency having a single phase to the vibrating element to cause the elliptical motion;

a resilient mount connected to the vibrating element.

118. (Twice Amended) A vibratory system for moving a driven element, the system including the driven element, the system comprising:

a vibratory element having a source of vibration that converts electrical energy directly to physical motion, the vibratory element having a predominant axis and having a selected contacting portion located to be engaged with the driven element at an angle α to a tangent to the driven element in the first direction at the selected contacting portion, the angle α being between about 10 and 80 degrees when the selected contacting portion is drivingly engaging the driven element, the angle α being selected to move the driven element along a driven path during use, wherein the vibratory element comprises means [is] excited with a first, single electrical signal having a single phase for vibrating [to vibrate] at a first frequency in a first vibration mode having sufficient motion along a first axis that the selected contacting portion moves along a first path to cause the driven element to move in a first direction, at least one of a resonator for the vibrating element and a resilient mounting system for the vibrating element being provided and configured to achieve the first path; [exciting] the vibratory element further comprising means excited with a second electrical signal to vibrate at a second frequency in a second vibration mode having sufficient motion that the selected contacting portion moves along a second path to move the driven element in a second direction, at least one of the resonator and resilient mounting system for the vibrating element being provided and configured to achieve the second path.

124. (Once Amended) A vibratory system for moving a driven element, the system having a source of vibration that converts electrical energy directly into physical motion and causing a resonator with a selected contacting portion to drivingly engage [a] the driven element, the selected contacting portion maintaining sufficient contact with the driven element to move the driven element during operation of the system, the system comprising:

a signal generator electrically connected to the source of vibration, the signal generator producing a first and second signal, each signal being communicated to the vibration source through the same electrical connection to the source of vibration, means for moving the selected contacting portion [moving] and the driven element in a first direction when the source of vibration is driven by the first signal, and moving the driven element in a second direction when the source of vibration is driven by the second signal, and further moves in the first direction when a single sinusoidal signal of a first frequency is applied, and can also move in the first direction when the first frequency is dominant and superimposed with plural sinusoidal signals of different frequencies, the second signal either not occurring simultaneously with the first signal or being of substantially different amplitude if it occurs simultaneously with the first signal.

127. (Once Amended) A vibratory system for moving a driven element in a first and second direction, the system including the driven element and comprising:

a vibratory element in driving communication with a resonator that has a selected contacting portion positioned to drivingly engage the driven element during use of the vibratory system to move the driven element in the first and second direction, the vibratory element comprising means for moving the selected contacting portion in a first and second elliptical paths each having a major and minor axis, at least one of the major and minor axes not coinciding with the direction of motion resulting from the elliptical path with which the axis is associated, the vibrating element resonating when excited by a first signal having a first frequency to cause the first elliptical path to move the driven element in the first direction, and further resonating when excited by a second signal having a second frequency to cause the second elliptical path to move the driven element in the second direction, each signal being communicated to the vibratory element through the same electrical connection to the vibratory element, the resonator having a longitudinal axis that is inclined at an angle α. to a tangent to the driven element in the first

direction at the selected contacting portion, the angle α being between about 10 and 80 degrees when the selected contacting portion is drivingly engaging the driven element.

130. (Once Amended) The vibratory system of Claim 127, wherein the resonator comprises an elongated member having an opening defined by at least two opposing sidewalls, and wherein the opening further includes two opposing first and second end walls on the longitudinal axis, the vibration element being held in compression under a defined preload by said opposing end walls, the end walls having one of a right-angled corner and a shaped surface leading to at least one of the first and second end walls to help press-fit the vibratory element into the opening and wherein the resonator further comprises:

a first section extending between a first and a second plane each of which is perpendicular to the longitudinal axis and spaced apart to completely include the selected contacting portion and spaced no further apart than needed to completely include the selected contacting portion;

a second section extending between a third and a fourth plane each of which is perpendicular to the longitudinal axis and spaced apart to completely include the first end wall and any shaped surface leading to the first end wall [to help press-fit the vibration element into the opening] and spaced no further apart than needed to completely include said first end wall and said shaped surface;

a third section extending between a fifth and a sixth plane each perpendicular to the longitudinal axis and spaced apart to completely include the second end wall and any shaped surface leading to the second end wall [to help press-fit the vibration element into the opening] and spaced no further apart than needed to completely embrace said second end wall and any shaped surface leading to said second end wall; and

wherein the resonator has a second axis perpendicular to the longitudinal axis and having portions of the resonator extending between the second and third planes and extending between the fourth and fifth planes such that, excluding the first, second and third sections, every cross-section of the resonator perpendicular to the second axis is the same.

132. (Once Amended) The vibratory system of Claim 80, wherein the resonator comprises an elongated member having an opening defined by at least two opposing sidewalls, and wherein the opening further includes two opposing first and second end walls on the longitudinal axis, the vibration element being held in compression under a defined preload by

said opposing end walls, the end walls having one of a right-angle corner and a shaped surface leading to at least one of the first and second end walls to help press-fit the vibratory element into the opening and wherein the resonator further comprises:

a first section extending between a first and a second plane each of which is perpendicular to the longitudinal axis and spaced apart to completely include the selected contacting portion and spaced no further apart than needed to completely include the selected contacting portion;

a second section extending between a third and a fourth plane each of which is perpendicular to the longitudinal axis and spaced apart to completely include the first end wall and any shaped surface leading to the first end wall [to help press-fit the vibration element into the opening] and spaced no further apart than needed to completely include said first end wall and said shaped surface;

a third section extending between a fifth and a sixth plane each perpendicular to the longitudinal axis and spaced apart to completely include the second end wall and any shaped surface leading to the second end wall [to help press-fit the vibration element into the opening] and spaced no further apart than needed to completely embrace said second end wall and any shaped surface leading to said second end wall; and

wherein the resonator has a second axis perpendicular to the longitudinal axis and having portions of the resonator extending between the second and third planes and extending between the fourth and fifth planes such that, excluding the first, second and third sections, every cross-section of the resonator perpendicular to the second axis is the same.

134. (Once Amended) The vibratory system of Claim 54, wherein the resonator comprises an elongated member having a longitudinal axis, and wherein the opening further includes two first and second opposing end walls on the longitudinal axis, the source of vibration being held in compression under a defined preload by said opposing end walls, the end walls having one of a right-angled corner and a shaped surface leading to at least one of the first and second end walls to help press-fit the vibratory element into the opening and wherein the resonator further comprises:

a first section extending between a first and a second plane each of which is perpendicular to the longitudinal axis and spaced apart to completely include the selected contacting portion and spaced no further apart than needed to completely include the selected contacting portion;

a second section extending between a third and a fourth plane each of which is perpendicular to the longitudinal axis and spaced apart to completely include the first end wall and any shaped surface leading to the first end wall [to help press-fit the vibration element into the opening] and spaced no further apart than needed to completely include said first end wall and said shaped surface;

a third section extending between a fifth and a sixth plane each perpendicular to the longitudinal axis and spaced apart to completely include the second end wall and any shaped surface leading to the second end wall [to help press-fit the vibration element into the opening] and spaced no further apart than needed to completely embrace said second end wall and any shaped surface leading to said second end wall; and

wherein the resonator has a second axis perpendicular to the longitudinal axis and having portions of the resonator extending between the second and third planes and extending between the fourth and fifth planes such that, excluding the first, second and third sections, every cross-section of the resonator perpendicular to the second axis is the same.

135. (Once Amended) The vibratory element of Claim 61, wherein the resonator comprises an elongated member having a longitudinal axis and further having an opening defined by at least two opposing sidewalls, and wherein the opening further includes two opposing first and second end walls on the longitudinal axis, the piezoelectric element being held in compression under a defined preload by said opposing end walls, the end walls having one of a right-angled corner and a shaped surface leading to at least one of the first and second end walls to help press-fit the vibratory element into the opening and wherein the resonator further comprises:

a first section extending between a first and a second plane each of which is perpendicular to the longitudinal axis and spaced apart to completely include the selected contacting portion and spaced no further apart than needed to completely include the selected contacting portion;

a second section extending between a third and a fourth plane each of which is perpendicular to the longitudinal axis and spaced apart to completely include the first end wall and any shaped surface leading to the first end wall [to help press-fit the vibration element into the opening] and spaced no further apart than needed to completely include said first end wall and said shaped surface;

a third section extending between a fifth and a sixth plane each perpendicular to the longitudinal axis and spaced apart to completely include the second end wall and any shaped surface leading to the second end wall [to help press-fit the vibration element into the opening] and spaced no further apart than needed to completely embrace said second end wall and any shaped surface leading to said second end wall; and

wherein the resonator has a second axis perpendicular to the longitudinal axis and having portions of the resonator extending between the second and third planes and extending between the fourth and fifth planes such that, excluding the first, second and third sections, every cross-section of the resonator perpendicular to the second axis is the same.

136. (Once Amended) The vibratory system of Claim 74, wherein the resonator comprises an elongated member having a longitudinal axis and further having an opening defined by at least two opposing sidewalls, and wherein the opening further includes two opposing first and second end walls on the longitudinal axis, the piezoelectric element being held in compression under a defined preload by said opposing end walls, the end walls having one of a right-angled corner and a shaped surface leading to at least one of the first and second end walls to help press-fit the vibratory element into the opening and wherein the resonator further comprises:

a first section extending between a first and a second plane each of which is perpendicular to the longitudinal axis and spaced apart to completely include the selected contacting portion and spaced no further apart than needed to completely include the selected contacting portion;

a second section extending between a third and a fourth plane each of which is perpendicular to the longitudinal axis and spaced apart to completely include the first end wall and any shaped surface leading to the first end wall [to help press-fit the vibration element into the opening] and spaced no further apart than needed to completely include said first end wall and said shaped surface;

a third section extending between a fifth and a sixth plane each perpendicular to the longitudinal axis and spaced apart to completely include the second end wall and any shaped surface leading to the second end wall [to help press-fit the vibration element into the opening] and spaced no further apart than needed to completely embrace said second end wall and any shaped surface leading to said second end wall; and

wherein the resonator has a second axis perpendicular to the longitudinal axis and having portions of the resonator extending between the second and third planes and extending between the fourth and fifth planes such that, excluding the first, second and third sections, every cross-section of the resonator perpendicular to the second axis is the same.

137. (Once Amended) The vibratory system of Claim 118, wherein the resonator comprises an elongated member having a longitudinal axis and further having an opening defined by at least two opposing sidewalls, and wherein the opening further includes two opposing first and second end walls on the longitudinal axis, the source of vibration being held in compression under a defined preload by said opposing end walls, the end walls having one of a right-angled corner and a shaped surface leading to at least one of the first and second end walls to help press-fit the vibratory element into the opening and wherein the resonator further comprises:

a first section extending between a first and a second plane each of which is perpendicular to the longitudinal axis and spaced apart to completely include the selected contacting portion and spaced no further apart than needed to completely include the selected contacting portion;

a second section extending between a third and a fourth plane each of which is perpendicular to the longitudinal axis and spaced apart to completely include the first end wall and any shaped surface leading to the first end wall [to help press-fit the vibration element into the opening] and spaced no further apart than needed to completely include said first end wall and said shaped surface;

a third section extending between a fifth and a sixth plane each perpendicular to the longitudinal axis and spaced apart to completely include the second end wall and any shaped surface leading to the second end wall [to help press-fit the vibration element into the opening] and spaced no further apart than needed to completely embrace said second end wall and any shaped surface leading to said second end wall; and

wherein the resonator has a second axis perpendicular to the longitudinal axis and having portions of the resonator extending between the second and third planes and extending between the fourth and fifth planes such that, excluding the first, second and third sections, every cross-section of the resonator perpendicular to the second axis is the same.

138. (Once Amended) A vibratory component for use with a vibratory system to move a driven element, the vibratory component having a source of vibration mounted to a resonator to form a vibrating element, the resonator comprising:

a selected contacting portion located to engage the driven element during use;

an elongated member having a longitudinal axis;

an opening defined by at least two opposing sidewalls, the opening further including two opposing first and second end walls on the longitudinal axis, the source of vibration being held in compression under a defined preload by said opposing end walls, the end walls having one of a right-angled corner and a shaped surface leading to at least one of the first and second end walls to help press-fit the vibratory element into the opening;

a first section extending between a first and a second plane each of which is perpendicular to the longitudinal axis and spaced apart to completely include the selected contacting portion and spaced no further apart than needed to completely include the selected contacting portion;

a second section extending between a third and a fourth plane each of which is perpendicular to the longitudinal axis and spaced apart to completely include the first end wall and any shaped surface leading to the first end wall [to help press-fit the vibration element into the opening] and spaced no further apart than needed to completely include said first end wall and said shaped surface;

a third section extending between a fifth and a sixth plane each perpendicular to the longitudinal axis and spaced apart to completely include the second end wall and any shaped surface leading to the second end wall [to help press-fit the vibration element into the opening] and spaced no further apart than needed to completely embrace said second end wall and any shaped surface leading to said second end wall;

wherein the resonator has a second axis perpendicular to the longitudinal axis and having portions of the resonator extending between the second and third planes and extending between the fourth and fifth planes such that, excluding the first, second and third sections, every cross-section of the resonator perpendicular to the second axis is the same; and

wherein the vibratory component vibrates in a first mode in the plane spanned by the first and second axes when the source of vibration is excited by a first electrical signal with a single, first frequency, said mode being neither a pure bending nor a pure longitudinal mode of the

vibratory component, wherein the resulting motion of the contacting portion has a sufficient amplitude to move the driven element in a first direction when engaged during use of the vibratory component.

144. (Once Amended) A vibratory system for moving a driven element, the vibratory system including [excluding] the driven element and comprising:

a vibratory element having a driving element comprising a piezoelectric element in driving communication with a resonator that has a selected contacting portion positioned to drivingly engage the driven element during use of the vibratory system;

a resilient element having one end connected to a base and an opposing end connected to the vibratory element to resiliently urge the selected contacting portion against the driven element during use of the vibratory system, at least one of the vibratory element and resilient element being configured to cause the selected contacting portion to move in a first motion when the vibratory element is excited by only a first signal at a single, first frequency having a single phase and provided to the driving element, the motion being of sufficient amplitude to move the driven element during operation of the system; and

wherein the resonator has a plurality of sidewalls defining a recess in which the piezoelectric element is held in compression, the sidewalls being stressed past their yield strength.